TENNESSEE DEPARTMENT OF EDUCATION
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Networking

Primary Career Cluster:	Information Technology
Consultant:	Bethany King Wilkes, (615) 532-2844, Bethany.Wilkes@tn.gov
Course Code(s):	6097
Recommended Prerequisite(s):	Information Technology Foundations (6095), Computer Systems (6094)
Credit:	1
Grade Level:	10-12
Aligned Student Organization(s):	Skills USA: www.tnskillsusa.com Brandon Hudson, (615) 532-2804, Brandon.Hudson@tn.gov
Teacher Resources:	http://www.tn.gov/education/cte/InformationTechnology.shtml

Course Description

Networking stresses the conceptual and practical skills necessary to design, manage, and diagnose network hardware and software. Course content, which is of the project-based format, allows students to interconnect workstations, peripherals, terminals, servers, and other networking hardware devices creating a typical infrastructure where all components communicate using the same language or protocols. This course will help prepare students to design, build, and maintain computer networks. The networking sub-cluster will help prepare students for the CompTIA Network + examination (2009 objectives) and cover the Cisco Certified Networking Associates (CCNA) Essentials exam. Mastery of course competencies will prepare students for successful completion of the Network + exam and promote fundamental skills for employment as a Network Administrator or Network Engineer.

It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.

Course Standards

Standard 1.0

Students will perform safety examinations and maintain safety records.

The student will:

1.1 Pass with 100% accuracy a written examination relating specifically to safety issues in relation to this course of study.
1.2 Pass with 100% accuracy a performance examination relating specifically to tools and equipment in relation to this course of study.
1.3 Follow rules and regulations to comply with personal and lab safety standards to include general standards, fire, and electrical.
1.4 Practice and apply health and safety OSHA standards as they pertain to the course.

Sample Performance Tasks

- Assess the work area for safety hazards.
- Design a corrections program for identified hazards.
- Model the appropriate protective equipment for an assigned task.
- Read manufacturer specifications to determine safe practices while working on various electrical and electronic systems.
- Demonstrate personal safety (e.g., dress, eye, and hearing devices, and jewelry).
- Demonstrate the handling and disposing of chemicals.
- Complete a safety inspection evaluating possible fire and water hazards.
- Develop a presentation on right to know laws and any other laws required for safety.
- Practice safe disposal procedures for chemicals used in related processes.
- Practice ergonomic processes when using the computers and equipment.
- Prepare Occupational Safety and Health notebook for the Tennessee SkillsUSA Championships.

Standard 2.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

The student will:

2.1 Cultivate positive leadership skills.
2.2 Participate in the student organization directly related to their program of study as an integral part of classroom instruction.
2.3 Assess situations, apply problem-solving techniques and decision-making skills within the school community, and workplace.
2.4 Participate as a team member in a learning environment.
2.5 Respect the opinions, customs, and individual differences of others.
2.6 Build personal career development by identifying career interests, strengths, and opportunities.

Sample Performance Task

- Create a leadership inventory and use it to conduct a personal assessment.

Standard 3.0

Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the work place.

The student will:

3.1 Assume responsibility for accomplishing classroom assignments and workplace goals within accepted time frames.
3.2 Develop advanced study skills.
3.3 Demonstrate and use written and verbal communication skills.
3.4 Read and understand technical documents such as regulations, manuals, reports, forms, graphs charts, and tables.
3.5 Apply the foundations of mathematical principles such as algebra, geometry, and advanced math to solve problems.
3.6 Apply basic scientific principles and methods to solve problems and complete tasks.
3.7 Understand computer operations and related applications to input, store, retrieve, and output information as it relates to the course.
3.8 Research, recognize, and understand the interactions of the environment and green issues as they relate to the course work and to the global economy.

Sample Performance Task

- Compute precise and exact measurements to solve distance for cables and propagation maps

Standard 4.0

Students will demonstrate an understanding of networking technologies, protocols, and standards.

The student will:

4.1 Differentiate a wide area network (WAN), Metropolitan Area Network (MAN) and local area network (LAN).
4.2 Compare and contrast a server, workstation, host, and client.
4.3 Analyze client-server, standalone server, and peer-to-peer networking.
4.4 Evaluate the characteristics of star, bus, mesh, ring, tree, and hybrid topologies, their advantages and disadvantages.
4.5 Differentiate between internet, intranet and extranet.

Sample Performance Task

- Construct and test a peer-to-peer network.

Standard 5.0

Students will analyze the open system interconnect (OSI) reference model, and identify the functions that pertain to each layer.

The student will:

5.1 Explain the function of each layer of the OSI model.
5.2 Identify the protocols that function at each layer according to the TCP/IP suite.
5.3 Identify the network hardware components that function at each layer.
5.4 Examine the IEEE project 802 standards and what is defined at each substandard.

Sample Performance Task

- Label common 802 standards based on a given definition.

Standard 6.0

Students will examine various wired media technologies used to interconnect nodes, their specifications, and their connector type(s).

The student will:

6.1 Identify common coaxial network media types, their topologies, and connectors.
6.2 Identify common twisted pair based media types, their topologies and connectors.
6.3 Identify fiber optic media types, their topologies, and connectors.
6.4 Differentiate between 568A, 568B, and crossover cable wiring standards.
6.5 Examine media types and their ability to reduce transmission errors.
6.6 Examine wiring distribution methods.

Sample Performance Task

- Construct a 568A and 568B straight through cable and connect them to network patch panels or network hardware.

Standard 7.0

Students will examine the TCP/IP suite, all the underlying protocols, the utilities to diagnose errors, and methods of addressing networks including subnetting procedures.

The student will:

7.1 Explain the function of common protocols that apply to TCP/IP (e.g., HTTP, IMAP, POP, ARP, SMTP, DNS)
7.2 Explain ports and sockets defined by each protocol (e.g., HTTP -80, FTP-21, POP-110)
7.3 Explain IP addressing classes and the differences between static and dynamic IP (DHCP).
7.4 Examine MAC, IPv4, and IPv6 addressing and the advantages and disadvantages of each.
7.5 Evaluate subnet classes, classless subnetting, and classless interdomain routing (CIDR).
7.6 Identify common network DNS host names.
7.7 Identify common TCP/IP utilities (e.g., netstat, ping, traceroute), their output, and when to use utility to verify communication.

Sample Performance Task

- Configure a network server to use DHCP and assign workstations with a dynamic IP address.

Standard 8.0

Students will examine major network operating systems (NOS), such as Microsoft Windows 2000, 2003, 2008 server, Linux enterprise server, and/or Novell Netware as well peer-to-peer networks using Microsoft Windows XP, Vista, and future operating systems.

The student will:

8.1 Examine the configuration of a client/server NOS and a peer-to-peer OS.
8.2 Examine the difference between local and global policies.
8.3 Identify the types of user rights offered and how they affect shared resources
8.4 Analyze Client/Server Directory Services management (e.g., Microsoft Active Directory, Novell NDS) and how they affect logon and security

Sample Performance Task

- Configure multiple user accounts and assign various rights to each user to demonstrate the effect on shares and resources.

Standard 9.0

Students will analyze WAN technologies and how networks interconnect over long distances using wireless or satellite communications.

The student will:

9.1 Examine various WAN technologies both wired and wireless and explain the advantages and disadvantages.
9.2 Evaluate 802.11a/b/g/n standards as they apply to wireless networking
9.3 Differentiate between broadband WAN technologies (e.g., ADSL, T1, ISDN, ATM, Frame Relay)

Sample Performance Task

- Install a Wi-Fi network using any 802.11 standard. Configure the access point for infrastructure mode and setup the workstations in a peer-to-peer environment.

Standard 10.0

Students will analyze methods of fault tolerance and recovery procedures as well as implement security methods to ensure only authorized users are able to access network resources.

The student will:

10.1 Evaluate redundancy levels in data storage with the implementation of RAID 0, 1, 5, 10, and 50.
10.2 Examine backup methods and procedures as well as the benefits of off-site data storage.
10.3 Identify network hardware and software devices that provide security and intruder detection
10.4 Differentiate between user authentication security methods (e.g., Kerberos, MS-CHAP, RADIUS) and hardware level filtering methods (MAC filtering, firewalls, PPTP, IPSec)
10.5 Demonstrate remote access to a network using applications and utilities included with the OS or NOS.
10.6 Explain some common security methods used by intruders and the procedures to mitigate or resolve these security violations (e.g., Denial of Service (DoS), Worms, War Driving).

Sample Performance Task

- Install multiple storage devices and configure either hardware or software RAID to demonstrate the advantages and disadvantages of each level.